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Forest Insect and Disease Management

5230
BIOLOGICAL
EVALUATION R2-77-4

MOUNTAIN PINE BEETLE

National Forest Lands
Colorado Front Range
Arapaho, Roosevelt,
Pike and San Isabel
National Forests

JUNE 1977



Rocky Mountain Region

U.S. Department of Agriculture Forest Service

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INTRODUCTION

The mountain pine beetle, *Dendroctonus ponderosae* Hopkins, continues to cause heavy ponderosa pine, *Pinus ponderosa* Laws, mortality on National Forest lands along the Colorado Front Range. Ponderosa pine mortality primarily occurs in overstocked stands and on poor sites. Losses due to the 1976 - 1977 mountain pine beetle generation were estimated to be over 850,000 trees on all Federal lands (Creasap and Minnemeyer 1976 ^{1/}).

On June 13 - 17, 1977, a mountain pine beetle brood survey was conducted in order to evaluate the overwintering population and predict the trend of the infestation for 1977. Utilizing Knight's (1960) Sequential Sampling Plan, ^{2/} which is based on bark samples, the trend of the current infestation was determined at 10 locations on the Arapaho and Roosevelt National Forests and 6 locations on the Pike and San Isabel National Forests (Table 1). Locations of the sample areas are shown on Figures 1 and 2. Brood samples from all locations showed that the population is increasing. The mountain pine beetle is again expected to cause epidemic ponderosa pine losses along the Front Range.

TECHNICAL INFORMATION

CAUSAL AGENT: *Dendroctonus ponderosae* Hopkins, Mountain pine beetle

HOST: *Pinus ponderosa* Laws, ponderosa pine

EXTENT OF INFESTATION: Ponderosa pine mortality occurs in overstocked stands along the Front Range of the Rocky Mountains, from south of Westcliff, Colorado and into southern Wyoming.

^{1/}

CREASAP, V. L. M. and C. D. MINNEMEYER. 1976. R2-76-9. Mountain Pine Beetle, Colorado Front Range. 12 pp.

^{2/}

KNIGHT, F. B. 1960. Sequential sampling of Black Hills beetle populations. USDA, For. Serv. Rocky Mtn. For. and Range Exp. Sta. Res. Note #28. 8 p.

LIFE HISTORY: The mountain pine beetle has one generation per year. Adults attack trees from mid-July through early September by boring through the bark to the cambium. The females then tunnel upward for 12 inches to 30 inches (these tunnels are called egg galleries). The females lay eggs alternately in individual niches along the sides of the gallery which is then packed with frass. After hatching, the larvae feed in individual channels (larval galleries) at right angles to the egg galleries in the phloem. The insect overwinters in the larval stage. In the spring, when the larvae are fully developed, they excavate an oval chamber at the end of the larval gallery (pupal chamber) and pupate. Finally, mature adults emerge from the pupal chamber by boring through the outer bark and fly to attack new trees, completing the generation.

METHODS

In accordance with Knight's (1960) Sequential Sampling Plan, two 6-by-6-inch bark samples were taken at dbh on opposite sides of currently infested ponderosa pine trees at 16 locations on the Arapaho and Roosevelt, and the Pike and San Isabel National Forests (Table 2 and maps). For each sample, the total number of brood, inches of egg gallery, number of each species of predators and parasites, and degree of woodpeckering were tabulated. Basal area at each infestation spot sampled, including infested and uninfested trees, was recorded. The beetle population at each sample area was then categorized as decreasing, static or increasing.

RESULTS AND CONCLUSIONS

At all of the 16 sample areas, brood samples showed an increasing trend for 1977. Parasites, predators and woodpeckers seem to be having little effect on the population. Data from all locations are summarized in Table 1. All samples were taken on National Forest lands, however, the data are applicable to all Lands.

The summary of the brood sample data indicates that epidemic losses can be expected to continue along the entire Rocky Mountain Front Range in 1977. Although the infestation is at epidemic levels, severe losses occur primarily in overstocked stands and on poor sites. The recommended long-term protection

measure to reduce beetle attack is to reduce growing stock levels to 80, or less, depending on site.^{3/} Silvicultural thinning will have a relief effect on the stand, enabling the residual trees to become more vigorous and reduce their susceptibility to beetle attack. Trees infected with dwarf mistletoe should be removed from the stands, since diseased and weakened trees seem to be more susceptible to beetle attack. This type of silvicultural management will require periodic re-entry into the stands to maintain the selected growing stock level.

Forest Insect and Disease Management personnel will continue to monitor the population during the Fall of 1977.

^{3/} MYERS, C. A. 1974. Multipurpose silviculture in ponderosa pine stands of the Montane zone of Central Colorado. USDA, For. Serv. Rocky Mtn. For. and Range Exp. Sta. Res. Paper RM-132. 15 pp.

TABLE 1 1977 MPB FRONT RANGE BROOD COUNT SURVEY

AREA	NUMBER TREES	AVERAGE DBH ±	NUMBER SAMPLES	TOTAL BROOD	AVERAGE BROOD ±	TOTAL STARTS	AVERAGE STARTS ±	TOTAL INCHES OF GALLERY	AVERAGE INCHES OF GALLERY ±	TOTAL CLERIDS	TOTAL COELOIDES	TOTAL MEDITERA	WOOD-PECKERING	BASAL AREA	ELEVATION (FEET)	PREDICTED TREND	ESTIMATED BUILD-UP RATIO
<u>NORTHERN FRONT RANGE</u>																	
Hanse Creek Redfeather Ranger District	11	12.28 ± .48	22	335	15.23 ± 2.60	47	2.14 ± .21	572	26.00 ± 1.60	0	0	1	Light	110	8,160	Increasing	1 : 1.5
Divide Creek Redfeather Ranger District	10	14.42 ± 1.17	20	497	24.85 ± 2.87	60	3.00 ± .24	534	26.00 ± 1.50	7	0	5	Light	130	6,480	Increasing	1 : 2.5
Elkhorn Creek Redfeather Ranger District	10	11.08 ± .72	20	390	19.50 ± 4.22	46	2.30 ± .16	528	26.40 ± 2.17	0	0	5	Light	140	8,400	Increasing	1 : 2.0
Skin Gulch Poudre Ranger District	11	14.14 ± .92	22	357	16.23 ± 2.83	41	1.86 ± .18	420	19.09 ± 1.74	3	0	17	Light	130	6,320	Increasing	1 : 1.6
Buckhorn Poudre Ranger District	10	12.58 ± .89	20	438	21.90 ± 3.49	48	2.40 ± .21	482	24.10 ± 2.12	6	0	2	Light	70	6,640	Increasing	1 : 2.2
TOTAL OR AVERAGE	52	12.91 ± .44	104	2,017	19.39 ± 1.45	242	2.33 ± .10	2,536	24.38 ± .85	16	0	30	Light	116	7,200	Increasing	1 : 1.9
<u>MID FRONT RANGE</u>																	
Dunraven Estes Park Ranger District	12	12.58 ± .57	24	634	26.42 ± 3.47	42	1.75 ± .23	537	22.38 ± 1.87	7	24	13	None		7,800	Increasing	1 : 2.6
Muggins Creek Estes Park Ranger District	14	9.68 ± .41	28	568	20.29 ± 2.74	64	2.29 ± .20	845	30.18 ± 2.22	1	0	7	Light	120	7,400	Increasing	1 : 2.0
S. Saint Vrain Creek Boulder Ranger District	22	12.59 ± .78	44	529	12.02 ± 1.50	63	1.43 ± .13	724	16.45 ± 1.19	6	0	4	Light	120	6,400	Increasing	1 : 1.2
Mid Boulder Creek Boulder Ranger District	10	12.07 ± .81	20	462	23.01 ± 3.71	42	2.10 ± .28	561	28.05 ± 2.21	1	0	15	Light	120		Increasing	1 : 2.3
Winger Gulch Boulder Ranger District	10	10.77 ± .85	20	391	19.55 ± 3.41	51	2.55 ± .14	621	31.05 ± 2.02	4	0	5	Light	110		Increasing	1 : 2.0
TOTAL OR AVERAGE	68	11.65 ± .35	136	2,584	19.00 ± 1.27	262	1.93 ± .09	3,288	24.18 ± .95	19	24	44	Light	118	7,200	Increasing	1 : 1.9
<u>SOUTH FRONT RANGE</u>																	
Bailey S. Platte Ranger District	3	12.53 ± 1.81	6	304	50.67 ± 10.71	12	2.00 ± .52	164	27.33 ± 4.80	3	11	16	Light	120	8,000	Increasing	1 : 5.1
Indian Creek S. Platte Ranger District	5	12.08 ± 1.32	10	458	45.80 ± 7.19	23	2.30 ± .45	266	26.60 ± 2.92	2	1	0	Light	180	8,000	Increasing	1 : 4.6
Spring Gulch S. Platte Ranger District	10	9.07 ± .48	20	397	19.35 ± 3.93	40	2.00 ± .21	577	28.85 ± 1.96	6	12	5	None	110	8,000	Increasing	1 : 1.9
West Creek S. Platte Ranger District	14	13.33 ± 3.56	28	601	21.46 ± 3.33	52	1.86 ± .26	689	24.61 ± 1.89	8	0	17	None	120	7,000	Increasing	1 : 2.1
Manitou Pikes Peak Ranger District	9	13.59 ± .86	18	471	26.17 ± 5.52	39	2.17 ± .26	470	26.11 ± 2.74	0	0	5	Light	100	7,000	Increasing	1 : 2.6
Ute Pass Pikes Peak Ranger District	3	18.70 ± 3.47	6	84	14.00 ± 5.51	16	2.67 ± .67	180	30.00 ± 7.97	0	0	0	None	70	8,500	Increasing	1 : 1.4
TOTAL OF AVERAGE	44	12.58 ± .54	88	2,305	26.19 ± 2.35	182	2.07 ± .13	2,346	26.67 ± 1.50	19	24	43	Light	117	7,750	Increasing	1 : 2.6
GRAND TOTAL OR AVERAGE	164	12.30 ± .25	328	6,906	21.05 ± .95	686	2.09 ± .06	8,170	24.91 ± .63	54	48	117	Light	117	7,436	Increasing	1 : 2.1

TABLE 2

MAP LOCATION DESIGNATIONS

NORTH FRONT RANGE (Roosevelt National Forest)

1. Hanse Creek
2. Divide Creek
3. Elkhorn Creek
4. Skin Gulch
5. Buckhorn

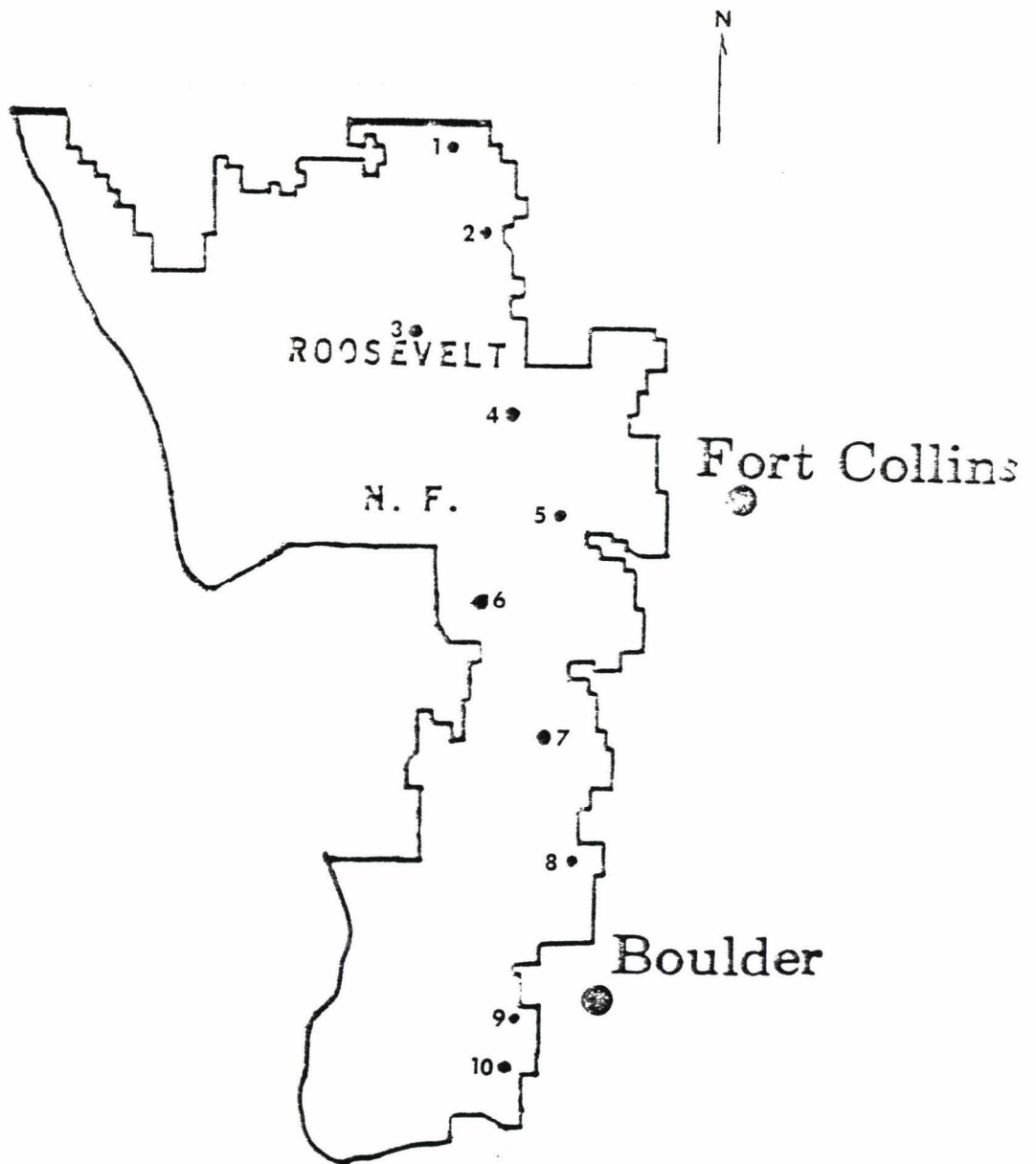
MID FRONT RANGE (Roosevelt National Forest)

6. Dunraven
7. Muggins Gulch
8. S. Saint Vrain Creek
9. Mid Boulder Creek
10. Winiger Gulch

SOUTH FRONT RANGE (Pike National Forest)

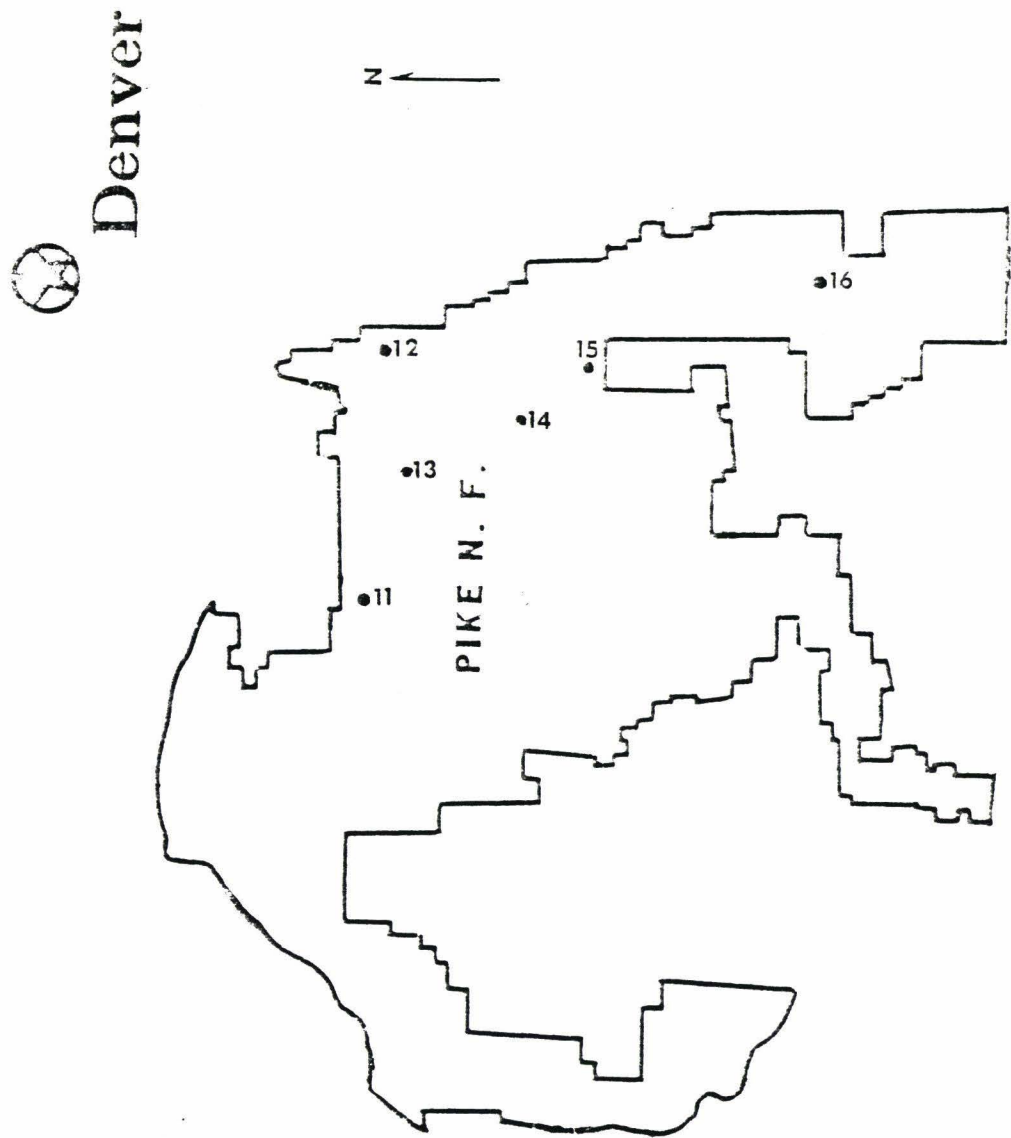
11. Bailey
12. Indian Creek
13. Spring Gulch
14. West Creek
15. Manitou
16. Ute Pass

FIGURE 1



MOUNTAIN PINE BEETLE BROOD SURVEY SAMPLE AREAS
1977

FIGURE 2



MOUNTAIN PINE BEETLE BROOD SURVEY SAMPLE AREAS
1977